

## Perceived Risk of Covid-19 and Trust on m-Health Transaction Intention

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### ABSTRACT

The purpose of the study is to determine the impact of trust antecedents on the intent of transactions in mHealth applications. The antecedents of trust included perceived ease of use, perceived usefulness, perceived quality, perceived safety, and perceived Covid 19 risks. Perceived risks of COVID19 were also examined for moderating effects on the relationship between trust and m-Health transaction intention. The study used a quantitative method with a survey approach. Our surveys are distributed online via the Lime Survey app. 253 respondents responded to the questionnaire according to the criteria. Results showed that the antecedents that had a significant impact on trust were perceived usefulness ( $P = 0.012$ ), perceived quality ( $P = 0.002$ ), and perceived safety ( $P = 0.000$ ). On the other hand, the perceived ease of use ( $P = 0.566$ ) and the perceived risk ( $P = 0.871$ ) did not significantly affect trust. Trust ( $P = 0.000$ ) and perceived risks of COVID19 ( $P = 0.011$ ) directly affect m-Health transaction intention. The study also found that the perceived risk of COVID19 did not impact the consumer trust in m-Health but directly impacted transaction intention.

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### 1. Introduction

Mobile Health (m-Health) is a digital platform for health products and services. Benefits of the m-Health application offered to consumers include a wide range of services, low prices, and easier access to medical services. The m-Health component focuses not only on technology but also on infrastructure, healthcare facilities, and healthcare professionals. The benefits of m-Health are more and more felt during the COVID 19 pandemic after the government has advised the public to avoid public facilities such as hospitals.

Trust is an important aspect that researchers and e-commerce executives need to investigate in order to build loyalty when shopping and selling online (Zhao, Huang, & Su, 2019). According to (Abbes, Hallem, & Taga, 2020), trust can influence potential consumers in their stores. Potential consumers try to make trust in sellers by looking at the various things considered in this study, including perceived ease of use, perceived usefulness, perceived safety, and perceived quality, and perceived risk COVID 19. Therefore, we examine the five perceptions as independent variables, trust as a mediator, and the m-Health transaction intention as a dependent variable.

Previous research by (Marakanon & Panjakajornsak, 2017) showed that consumers' perceptions of low risk can significantly increase their trust in sellers. Consumers will trust the seller if the risk they believe is low. In this study, in addition to perceived risk, it was also shown that perceived quality significantly increases consumer trust in the seller. Therefore, it can be concluded that the better the quality perception of potential consumers towards the e-commerce platform, the higher their trust in the platform.

Public trust in digital products is underpinned by several factors. One of the most popular theories in the world of technology and management is the Technology Acceptance Model (TAM). The pioneers of this theory can undermine trust in mHealth applications. According to (Sezgin, Özkan-Yildirim, & Yildirim, 2018), TAM's pioneers are perceived ease of use and perceived usefulness. (Y. Kim & Peterson, 2017) add perceived security as an antecedent of trust when buying and selling on websites online.

The antecedents of trust in e-commerce consist of five components: quality, risk, technology acceptance, personality, and mobility (Sarkar, Chauhan, & Khare, 2020). During this pandemic, consumers think about leaving home (recreation) can be categorized as a risk (Rather, 2021). The perceived risk associated with consumer fear of COVID 19 is a new indicator for completing Sarkar's study. According to Addo, Jiaming, Kulbo, & Liangqiang (2020), consumer fears about the illness caused by COVID19 have a positive impact on the intention to buy personal protective equipment.

Some previous studies on COVID19 perceived risk maybe support the relationship between tourist destination reputation, tourist destination CSR, perceived trust, and tourists' revisit intentions (Hassan & Soliman, 2021). The perceived risk of COVID19 also has a moderation impact on the relationship between social media and CBE (Customer Brand Engagement), the relationship between CBE and return intentions, and the relationship between CBE and BCC (Brand Cocreation) (Rather, 2021).

## **2. Conceptual Framework and hypothesis development**

### **2.1 Perceived ease of use & Perceived usefulness**

Trust is a variable with various antecedents and consequences in consumer behavior theory. In a study Khan, Umer, Umer, & Naqvi (2021) tested public trust in the Pakistani government's social media account services. He found that ease of use and perceived usefulness were antecedents of trust. (Sarkar et al., 2020) have researched a meta-analytic paper discussing the antecedents of trust. The variables are the perceived ease of use and the perceived usefulness that affect aspects of technology acceptance theory.

Perceived ease of use and perceived usefulness combined with two perceived risks (security and privacy) impacts initial trust in the use of self-driving cars (Zhang et al., 2019). Corritore, Marble, Wiedenbeck, Kracher, & Chandran (2005) conducted an experimental study to measure user trust on two websites using three perceptions: perceived reliability, perceived usability, and perceived risk. The results show that perceived ease of use can affect user trust in the website. Therefore, a hypothesis can be derived from some of the above explanations.

**H1:** Perceived ease of use has a positive effect on trust in m-Health applications

**H2:** Perceived usefulness has a positive effect on public trust in m-Health applications

### **2.2 Perceived security**

A previous study (J. Kim, Jin, & Swinney, 2009) categorized security and data protection factors as aspects of e-commerce quality that have a positive impact on consumer trust in online transactions. Perceived security is also included in the financial security aspect of the electronic services of web transactions (Harris & Goode, 2010). Thaichon, Lobo, Prentice, & Quach (2014) explains that the quality of online services can be divided into four aspects: network quality, customer service and technical support, information quality, and data protection. These four aspects have a positive impact on consumer trust in your website. Perceived security can directly affect consumer trust in e-commerce. The following hypothesis can be made.

**H3:** Perceived Security has a positive effect on consumer trust in m-Health applications.

### **2.3 Perceived quality**

Perceived quality and perceived risk have a direct impact on consumer trust (Marakanon & Panjakajornsak, 2017). Earlier research on organic brands (Konuk, 2018) shows that perceived (food) quality has a significant positive impact on consumer trust. (Harris & Goode, 2004, 2010; Thaichon et al., 2014) explained that the quality of service has a positive impact on consumer trust in the platform.

Luo, Wang, Zhang, Niu, & Tu (2020) found a positive effect on e-commerce quality to online consumer trust. The quality aspects are system quality, security assurance, product diversity, and after-sales service. The perceived quality (Chi, 2018) is an aspect of perceived benefits, which is one of the variables of technology acceptance theory. The following hypothesis can be derived.

**H4:** Perceived quality has a positive impact on consumer trust in m-Health applications

### **2.4 Perceived risk of COVID-19**

A study of e-commerce (Young Kim & Kim, 2004) found a negative impact between perceived risk and trust. The lower the risk, the higher the trust in the e-commerce platform. In this study, the risk of COVID 19 means consumers fear activities outside the home. Patients who are afraid of medical examinations in medical facilities such as pharmacies, clinics, and hospitals. (Bae & Chang, 2021) divides COVID19's perception of risk into two aspects: cognitive and emotional. The perceived risk of COVID19 (cognitive) has a positive impact on the intention of tourists visiting non-tactical tourism, while the emotional side has a negative impact. In addition to the tourism context, the perceived risk of COVID 19 also influences purchasing behavior in purchasing personal protective equipment. The higher the risk/fear of Covid19, the higher intention to purchase (Addo et al., 2020)

(Alam, Alam, Rahman, & Taghizadeh, 2021) wrote perceived risk of COVID19 as SQ (self-quarantine) to avoid public areas. His research results show that SQ supports the relationship between behavioral intention to use mHealth applications in Bangladesh. Another study conducted by (Rather, 2021) found that perceived risk and fear of COVID19 during pandemic could decrease effects of CBE (Customer Brand Engagement) to revisit in tourism destinations. Hassan & Soliman (2021) also investigated the moderation effect of tourists in Egypt on the relationship between trust in travel agencies and willingness to revisit. Therefore, the hypothesis can be derived from some of the above statements.

**H5:** Perceived risk of COVID19 has a positive impact on consumer trust in m-Health applications.

**H6:** Perceived risk of COVID19 has a positive impact on consumer m-Health transaction intention.

**H7:** Perceived risk of COVID19 moderates the relationships between trust and m-Health transaction intention.

**2.5 Trust and m-Health transaction intention**

m-Health transaction intention is a consistent consumption behavior in marketing. The study assumes that trust influences m-Health transaction intention. The purchase intention is such potential consumers want to buy in online stores (Pavlou, 2003). An indicator of success in e-commerce can be read from how strongly consumers are trying to act. The implications of this study are the intention of performing online transactions in e-commerce (He, Lu, & Zhou, 2008). Consumer trust can reduce the uncertainty of transactions on websites, so many studies have shown that the outcome of trust is behavioral intention (Khan et al., 2021; Sarkar et al., 2020; Wang, Ngamsiriudom, & Hsieh, 2015). A hypothesis based on some of the above statements.

**H8:** Trust in the mHealth application has a positive impact on transaction intention

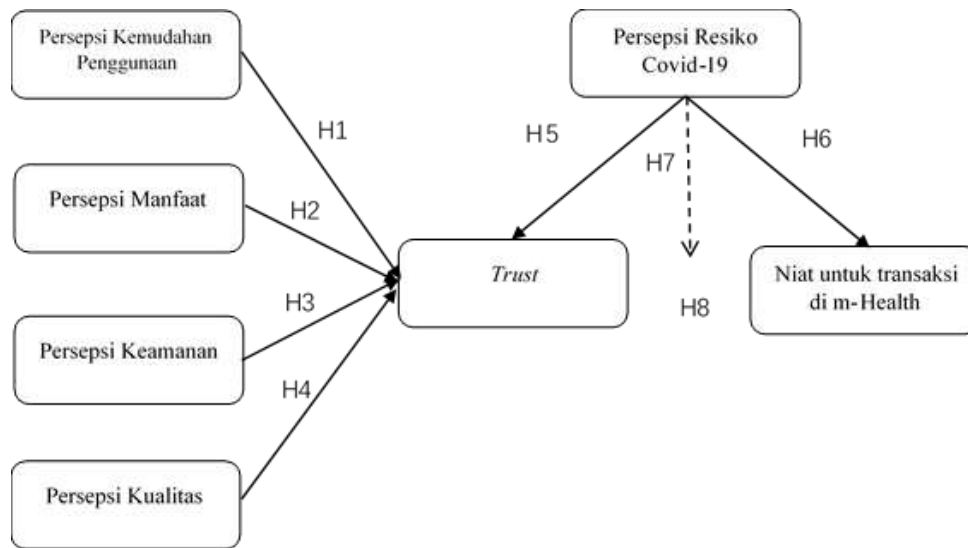


Figure 1 Conceptual framework

**3. Materials and Methods**

This research is quantitative with a survey approach. According to (Cooper & Schindler, 2014) the development of the internet is very helpful for researchers in conducting surveys. Sources of data were taken from questionnaires distributed online to the research object. The application for preparing the questionnaire used Lime Survey. Questionnaires were distributed using social media Whatsapp via private chat or groups. The number of respondents who met the criteria was 253 people from a total of 311 complete questionnaires.

Data were analyzed using Partial Least Squares Structural Equation Model (PLS-SEM) method to evaluate the measurement and structure of the model (Hair, Ringle, & Sarstedt, 2011). Sarstedt, Ringle, & Hair, (2020) said that PLS-SEM has become a popular method used in complex research models with latent variables and relationships between variables. This study uses a measurement scale that uses 5 Likert scales with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree. The Likert scale is a scale developed by Rensis Likert which is the most frequently used scale of the summated rating scales (Cooper & Schindler, 2014).

**4. Results and Analysis**

The data was collected using an online survey (Lime Survey). 331 respondents answered the question completely. Then we filtered the data and the remaining 253 respondents could be used as survey data. The complete respondent profile is in the table below.

**Table 1**  
**Respondents' characteristics**

Description	Keterangan	Persentase
Gender	Men	32,20%
	Women	66,80%
Age	15-25 years old	13,04%
	26-40 years old	63,64%
	Above 40 years old	23,32%
Location	Soloraya	55,73%
	Outside	44,27%
Smartphone user experience	< 1 year	3,56%
	1-5 years	13,04%
	6-10 years	39,53%
	> 10 years	43,87%
Education	Junior High School	0,79%
	Senior High School	10,28%
	Diploma (D3)	7,51%
	Bachelor (S1)	52,57%
	Postgraduate (S2)	25,69%
	Doctoral (S3)	1,19%
others	1,98%	
Income	< 2.500.000	26,09%
	2.500.000 – 5.000.000	40,32%
	5.000.000 – 7.500.000	14,23%
	7.500.000 – 10.000.000	9,88%
	> 10.000.000	9,49%

The table above shows that the respondents of this survey were divided into two groups: male and female. The number of male respondents was 84 (33%) and that of females was 169 (67%). There are more women than men. The majority of respondents in this survey are 26-40 years old is 161 respondents (63.64%). In addition, the second largest age group (over 40 years old) is 59 respondents (23.32%), and the third group is 33 respondents (13.04%) 15-25 years old.

The number of respondents who live in Solo and its surroundings is more than those who live outside Soloraya. The number of respondents who live in Soloraya is 141 respondents (55.73%) and those who live outside Soloraya are 112 respondents (44.27%). Based on the table, the respondents of this study have several using experience with smartphones. The number of respondents who have more than 10 years of experience is 111 respondents (43.87%), 6-10 years is 100 respondents (39.53%), 1-5 years are 33 people (13.04%) and less than one year there are only 9 respondents (3.56%).

**4.1 Measurement model assessment**

Data analysis begins with testing the measurement model and continues with testing the structural model. The results of the construction model test are shown in Table 2 below. The outer model measures the indicators of research. The latent variable measurement model in this study is the reflection measurement model that variables are correlated and exchangeable, based on the reliability and validity of the indicators. Outer loading is the basis of indicator reliability. The outer loading value required in the theoretical test is 0.7, if it is less than 0.7 we should erase it. This study was two indicator variables with an outer loading less than 0.7: Perceived security (PS4 = 0.440) and transaction intention (ITT4 = 0.329).

**Table 2**  
**Reliability and validity of measurable items**

Construct	Item	Factor Loading	Cronbach Alpha	Composite Reliability	AVE
Intention to transact	ITT[ITT1]	0,898	0,914	0,946	0,854
	ITT[ITT2]	0,925			
	ITT[ITT3]	0,915			
	ITT[ITT4]	<b>0,440</b>			
Perceived Ease of Use	PEOU[PEOU1]	0,845	0,904	0,933	0,777
	PEOU[PEOU2]	0,889			
	PEOU[PEOU3]	0,900			
	PEOU[PEOU4]	0,890			
Perceived Quality	PQ[PQ1]	0,889	0,897	0,936	0,829
	PQ[PQ2]	0,923			
	PQ[PQ3]	0,919			
Perceived Security	PS[PS1]	0,890	0,880	0,917	0,735
	PS[PS2]	0,830			
	PS[PS3]	0,870			
	PS[PS4]	<b>0,329</b>			
	PS[PS5]	0,827			
Perceived Usefulness	PU[PU1]	0,854	0,873	0,913	0,724
	PU[PU2]	0,856			
	PU[PU3]	0,825			
	PU[PU4]	0,870			
Perceived Risk of COVID19	RISK[RISK1]	0,935	0,905	0,940	0,839
	RISK[RISK2]	0,883			
	RISK[RISK3]	0,929			
Trust	TRUST[TRUST1]	0,891	0,867	0,919	0,790
	TRUST[TRUST2]	0,901			
	TRUST[TRUST3]	0,874			

After ITT4 and PS4 were eliminated, Cronbach alpha, composite reliability, and AVE tests showed results above > 0.7. This shows that the criteria for the measurement model are good. Furthermore, discriminant validity was tested using the Fornell-Larcker criteria. The test results can be seen in the following table;

**Table 3**  
**Fornell Larcker Criterion**

	ITT	PEOU	PQ	PU	RISK	PS	Trust
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ITT	<b>0,924</b>						
PEOU	0,256	<b>0,881</b>					
PQ	0,389	0,486	<b>0,910</b>				
PU	0,542	0,637	0,598	<b>0,851</b>			
RISK	0,296	0,427	0,319	0,497	<b>0,916</b>		
PS	0,460	0,558	0,708	0,601	0,349	<b>0,857</b>	
Trust	0,490	0,512	0,671	0,611	0,342	0,732	<b>0,889</b>

**4.2 Structural Model Evaluation**

The process of testing the structural model run until getting the required criteria. Improvements are made if there are problems in the measurement model. The existing test results show that all of the measurement model testing criteria are good. The process is continued by testing the relationship between variables using a standard 95% confidence level with a t value of 1.96. The results of complete hypothesis testing can be seen in the following table:

**Table 4**  
**Structural model results**

Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV)	P.Values	Keterangan
Perceived Ease of Use -> Trust (H1)	0,035	0,040	0,060	0,574	<b>0,566</b>	<b>not supported</b>
Perceived Usefulness -> Trust (H2)	0,183	0,181	0,073	2,508	0,012	supported
Perceived Security -> Trust (H3)	0,433	0,434	0,061	7,144	0,000	supported
Perceived Quality -> Trust (H4)	0,236	0,236	0,074	3,170	0,002	supported
Perceived Risk of COVID 19 -> Trust (H5)	0,010	0,010	0,063	0,162	<b>0,871</b>	<b>not supported</b>
Perceived Risk of COVID 19 -> m-Health Transaction Intention (H6)	0,163	0,165	0,064	2,560	0,011	supported
Trust -> m-Health Transaction Intention (H8)	0,432	0,431	0,055	7,831	0,000	supported

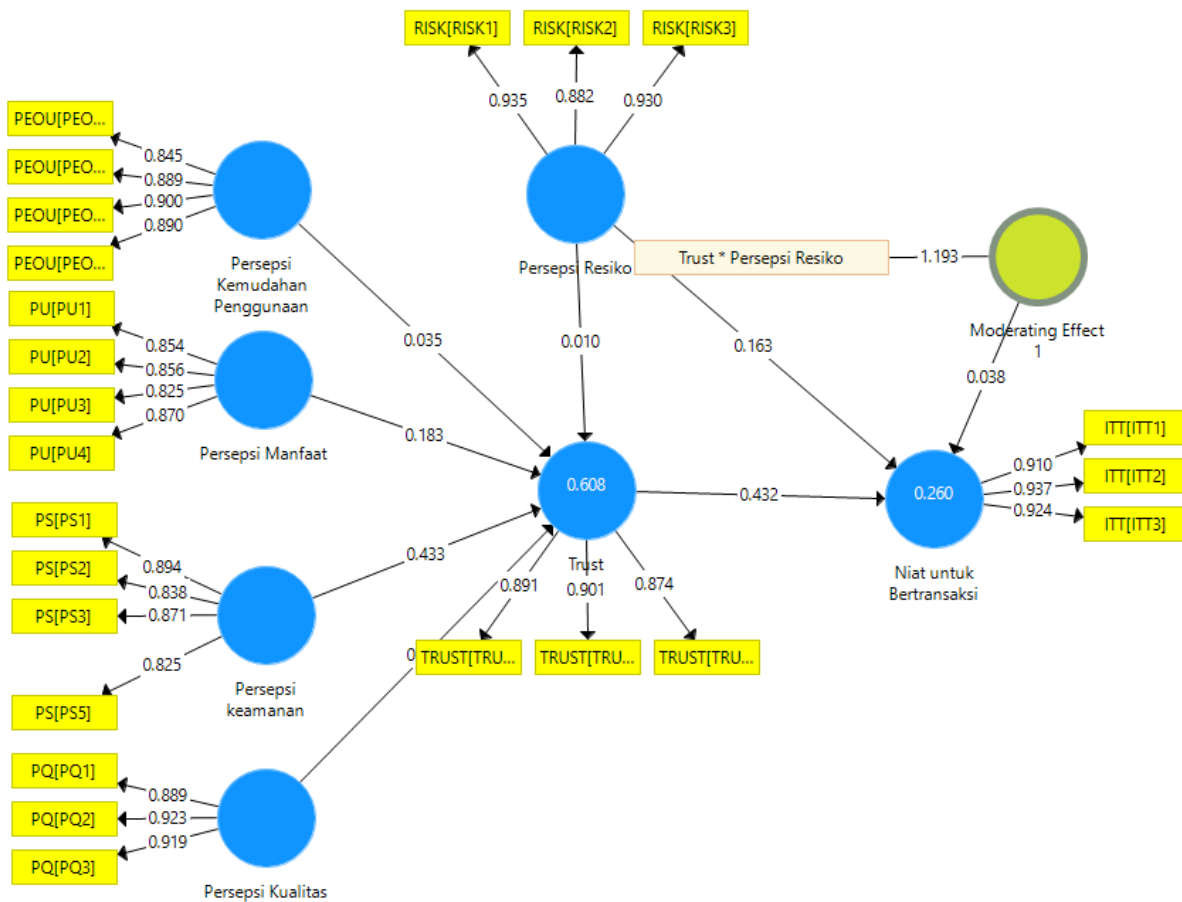


Figure 2. Structural Model

The structural model was analyzed using the criteria suggested by Henseler et al. (2016, pp. 207–231) namely Standardized Root Mean Square Residual (SRMR). SRMR is a measure of the mean absolute value of the residual covariance. Its mechanism of action is based on the transformation of the sample matrix and predicted matrix into a correlation matrix. SRMR is defined as the difference between the observed correlation and the correlation matrix in the model. Henseler et al. (2014) introduced SRMR as a measurement of goodness of fit for PLS-SEM which can be used to avoid model specification errors. An SRMR value of less than 0.10 was considered an acceptable model fit. In addition, the predictive power of the model was examined using the R2 and Q2 values of all predicted variables. SRMR value of this study is less than 0.10. It means the goodness of fit of this structural model is accepted (Table 5).

**Table 5**  
**Standardized Root Mean Square Residual (SRMR)**

	Saturated Model	Estimated Model
SRMR	0,050	0,061
d_ULS	0,753	1,109
d_G	0,480	0,515
Chi-Square	734,569	770,849
NFI	0,848	0,840

**Table 6**  
**Mediation Effect**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Stat	P Values	Conclusion
PEOU -> Trust -> ITT	0,015	0,017	0,026	0,575	<b>0,565</b>	<b>not supported</b>
PQ -> Trust -> ITT	0,102	0,101	0,034	2,958	0,003	supported
PU -> Trust -> ITT	0,079	0,078	0,035	2,283	0,022	supported
RISK -> Trust -> ITT	0,004	0,004	0,028	0,161	<b>0,872</b>	<b>not supported</b>
PS -> Trust -> ITT	0,187	0,187	0,037	5,094	0,000	supported

**Table 7**  
**Moderation Effect**

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Stat	P Values	Conclusion	Moderation
Moderating Effect 1 Trust -> Transaction Intention	0,038	0,041	0,053	0,717	<b>0,474</b>	<b>not supported</b>	<b>No</b>

**5. Discussion**

Data were analyzed using the Partial Least Squares Structural Equation Model (PLS-SEM) method to measure and evaluate the model structure (Hair et al., 2011). PLS-SEM has become a popular method that is often used in research models with complex relationships/variables (Sarstedt et al., 2020). PLS-SEM is more flexible than others in terms of data requirements and specification of the relationship between model and indicator variables. Researchers use the Smart PLS 3 application because this application is easy to use to analyze multivariate research data.

The results of the model measurement test as shown in table 4 show that the perceived ease of use variable does not significantly affect consumer trust in the m-Health application, this is not the same as the results of Sarkar et al research on perceived ease of use as one of the antecedents of consumer confidence. Likewise, according to (Corritore et al., 2005), the perception of the ease of use of the website affects user trust.

In the theory of technology acceptance or what is often called TAM, perceived ease of use and perceived usefulness were the main antecedents as research conducted by Sarkar et al. In this study, the relationship between perceived usefulness and consumer trust was significant. It shows that the result of this study is like previous research conducted by Sarkar and Zhang (Sarkar et al., 2020; Zhang et al., 2019).

Based on research, according to a (Harris & Goode, 2010) study, the relationship between perceived security and consumer trust has a significant impact. Harris investigated the impact of perceived security on e-trust transactions through websites. Perceived safety can affect consumer trust in e-commerce (Cui, Lin, & Qu, 2018).

The quality of the platform is especially appealing to consumers. According to Luo et al., (2020), perceived quality has a positive impact on online consumer trust. The results of this study show that perceived quality has a significant impact on consumer trust in mHealth. This corresponds study (Marakanon & Panjakajornsak, 2017) that perceived quality has a positive impact on consumer trust, either directly or mediated by perceived risk.

In this study, the perception of COVID19 risk did not significantly affect consumer trust, but it significantly affected the intent of the transaction. Awareness of high COVID 19 risk leads consumers to access high medical services and is also studied by (Addo et al., 2020), they investigated increased buying behavior of personal protective equipment when consumers were also at high risk/fear of the Covid19 virus. However, the results of this study also explain that the perception of the risk of COVID 19 did not significantly affect consumer trust.



According to (Rather, 2021) survey, COVID19's perception of risk has a moderation impact on the relationship between customer brand engagement with a brand and the intent to visit a tourist attraction (Alam et al., 2021) also found that awareness of COVID19 risk had a moderate impact on the relationship between behavioral intention and use mHealth application in Bangladesh. The results of this study are inconsistent with previous studies in which risk perception does not moderate effect on the relationship between mHealth trust and transaction intention.

Regarding consumer behavior in e-commerce, according to (He et al., 2008), an indicator of e-commerce success can be seen in the consumer's intention to act in the mHealth application. In some studies, the risk is always related to trust. However, the risk seems to deny trust in the seller (application). This may be related to changes in consumer behavior during this pandemic, which is a panic buying that leads people to buy something immediately, without worrying about the seller's reputation (trust in seller).

## 6. Conclusion

Several factors affect consumer trust in mHealth applications. The results of this study show that the factors that significantly impact trust are perceived usefulness, perceived quality, and perceived security. The perceived ease of use did not significantly affect trust, and the perceived risk of COVID19 was not significant. However, risk awareness has a significant impact on m-Health's transaction intention.

The limitations of this research were first, due to the location of the respondents, we could only divide the respondents into two groups, Soloraya and non-Soloraya, and future studies should expand respondents based on location more than two groups. Second, the results of this study show that perceived ease of use and perceived risk of COVID19 do not have a significant impact on consumer trust, so they can be tested on a larger range of respondents for future surveys. Third, the moderation of the perceived risk of COVID19 on the relationship between trust and transaction intention was no effect. Other variables should be used for further research to moderate ex accessibility and customer review.

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